only in advanced stages of cell disorganization, and not during the mycoplasma stage. ERIKSSON also fails to find "hyphae" in the disorganizing nucleus, but believes the structures interpreted as such by ZACH to be chromatin threads.

A paper by BEAUVERIE[6] relates to the "plasmanucleoli" described by ERIKSSON. BEAUVERIE finds in the cells of fungi certain granules stainable with basic dyes, which he terms "corpuscules métachromatiques." In wheat plants attacked by rust he finds similar bodies in the mycelium, and in the host cells in the regions invaded by the fungus, but not in the normal cells. These granules he identifies with the plasmanucleoli of ERIKSSON. Just how giving these bodies a new name would, in itself, invalidate ERIKSSON'S interpretation or constitute a new interpretation is not easy to see.

The solution of the problem which gave rise to the mycoplasma theory probably lies in the direction suggested by the recent work of PRITCHARD[7] on rust-infected grain seeds. PRITCHARD finds that rust-infected wheat seeds, to which little attention has been given from this viewpoint, contain living mycelium in the neighborhood of the rust sori. When such seeds are planted the fungus resumes its activity with the growth of the seedling, and penetrates both the stem and root of the young plant. It also grows in the spaces between the leaf sheaths. The formation of new uredo pustules from this mycelium has not been observed, nor have rusted wheat plants been obtained from infected seed grain under conditions rigorously excluding external infection.—H. HASSELBRING.

Spermatogenesis in Bryophytes.—WILSON[8] has completed his studies of spermatogenesis in *Mnium hornum* and also has investigated spermatogenesis in *Atrichum undulatum* and *Pellia epiphylla*. Because of the somewhat remarkable statements of J. and W. Docters VAN LEEUWEN-REIJNVAAN that centrosomes are constantly present in the spermatogenous cells in several species of *Polytrichum* and *Mnium*, and that in the ultimate division of these cells a reduction takes place whereby the haploid number of chromosomes is reduced to half (in *Polytrichum* to 3, and in *Mnium* to 4), these later divisions were studied with exceeding care.

In *Mnium hornum*, in the early stage of the penultimate division in spermatogenesis, a body is cut off by constriction from the nucleolus. In earlier divisions of the spermatogenous cells this division of the nucleolus was not observed. This body was never discovered outside of the nucleus and soon

[6] BEAUVERIE, J., L'hypothèse du mycoplasma et les corpuscules métachromatiques. Compt. Rend. **152**:612–615. 1911.

[7] PRITCHARD, F. J., The wintering of *Puccinia graminis Tritici* E. & H. and the infection of wheat through the seed. Phytopathology **1**:150–154. *pl. 1. fig. 1.* 1911. See also BOT. GAZ. **52**:169–192. *pl. 1.* 1911.

[8] WILSON, MALCOLM, Spermatogenesis in the Bryophyta. Ann. Botany **25**:415–457. *pls. 37–38. figs. 3.* 1911.

disappears. During prophase of the ultimate division of the spermatogenous cells, the nucleolus divides into two separate masses by constriction, and before separation is complete, a third small body buds off from one of the nucleolar bodies. These three bodies become free, but do not pass beyond the nuclear membrane, and the smallest one is considerably larger than is usually associated with centrosomes. These bodies were lost during later prophase, and their fate could not be determined. Chromosomes are constantly 6 in number and no difference in size could be observed.

The daughter nuclei at first contain several deeply staining granules, which later are replaced by a single centrally placed nucleolus. This nucleolus divides by constriction into two bodies, one of which again divides. The nuclear membrane then becomes indistinct, and two of the nucleolar bodies pass out into the cytoplasm, and probably increase by division, as more than two can often be found. Later they become rodlike and are usually grouped near a vacuole. At this stage the nucleus is barely distinguishable as a mass somewhat denser than the surrounding cytoplasm. The nucleolus may again cut off one or two bodies, which probably pass out into the cytoplasm and become associated with the rodlike bodies. These rods now increase in length, become irregularly curved, and look very much like chromosomes. Their number is usually three or four. This situation would seemingly explain the double reduction of J. and W. Docters VAN LEEUWEN-REIJNVAAN. The nucleolus now enters upon a third period of division, giving rise to two bodies which pass out into the cytoplasm, one being most likely the blepharoplast; the other WILSON thinks is perhaps the same as the "Nebenkörper" described in *Marchantia* by IKENO. All but one or two of the rodlike bodies now coalesce and form a spherical mass, which the author names the "limosphere." Later, when the limosphere is seen in optical section, it appears as a ring. In the last stages studied (the nearly mature sperms) the limosphere still persisted.

In *Atrichum undulatum* the sequence is much the same as in *Mnium*. No centrosomes could be found, and the chromosome number is 17. In *Pellia epiphylla*, centrospheres and perhaps centrosomes are present in later divisions in the antheridium. The author thinks the blepharoplast may be derived from the centrosome. A limosphere and accessory body are present in the sperm, but their origin was not determined.

WILSON'S work gives evidence of extremely careful study, and seems to furnish a satisfactory explanation for the fantastic performances which have been reported as taking place during spermatogenesis in Musci.—W. J. G. LAND.

Origin of the mitotic figure.—LAWSON'S[9] study of the microspore mother cells of *Disporum*, *Gladiolus*, *Yucca*, *Hedera*, and the vegetative cells in the root tip of *Allium* has revealed a series of stages in the development of

[9] LAWSON, A. ANSTRUTHER, Nuclear osmosis as a factor in mitosis. Trans. Roy. Soc. Edinburgh **48**:137–161. *pls. 1–4.* 1911.